PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing: 16 December 1999 (16.12.99)	
International application No.: PCT/JP99/03035	Applicant's or agent's file reference: P20603-P0
International filing date: 07 June 1999 (07.06.99)	Priority date: 12 June 1998 (12.06.98)
Applicant: UWABATA, Hideyo et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International preliminary Examining Authority on:

25 October 1999 (25.10.99)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer:

J. Zahra

Telephone No.: (41-22) 338.83.38

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TX 31651 epo nl
FAX +31 70 340 3016

Europäisches Patentamt
Zweigstelle in Den Haag Recherchen-abteilung

European Patent Office
Branch at The Hague Search division

Office européen des brevets
Département à La Haye Division de la recherche

Calderbank, Thomas Roger
MEWBURN ELLIS
York House
23 Kingsway
London WC2B 6HP
GRANDE BRETAGNE

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RECORDS ENTD
RECORDS SENT
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RENEWAL PAID
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Datum/Date
06.06.02

Zeichen/Ref./Réf.	Anmeldung Nr./Application No./Demande n°./Patent Nr./Patent No./Brevet n°.
TRC/FP5995592	02004853.4-2202-

Anmelder/Applicant/Demandeur/Patentinhaber/Proprietor/Titulaire
MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.

COMMUNICATION

The European Patent Office herewith transmits as an enclosure the European search report for the above-mentioned European patent application.

If applicable, copies of the documents cited in the European search report are attached.

☒ Additional set(s) of copies of the documents cited in the European search report is (are) enclosed as well.

The following specifications given by the applicant have been approved by the Search Division:

☐ abstract ☒ title

☒ The abstract was modified by the Search Division and the definitive text is attached to this communication.

The following figure will be published together with the abstract: 30

EUROPÄISCHES PATENTAMT - DEN HAAG - EUROPEAN PATENT OFFICE - THE HAGUE - OFFICE EUROPÉEN DES BREVETS - LA HAYE

REFUND OF THE SEARCH FEE

If applicable under Article 10 Rules relating to fees, a separate communication from the Receiving Section on the refund of the search fee will be sent later.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 00 4853

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	WO 92 05661 A (THOMSON CONSUMER ELECTRONICS) 2 April 1992 (1992-04-02) * page 2, line 9 - line 21 * * page 3, line 31 - page 4, line 11; figures 4,5 *	1-5	H04N3/32 H04N3/30
X	EP 0 567 931 A (THOMSON CONSUMER ELECTRONICS) 3 November 1993 (1993-11-03) * page 3, line 53 - page 4, line 13 *	1-5	
A	PATENT ABSTRACTS OF JAPAN vol. 095, no. 001, 28 February 1995 (1995-02-28) & JP 06 284309 A (SONY CORP), 7 October 1994 (1994-10-07) * abstract *	1-5	
D,A	PATENT ABSTRACTS OF JAPAN vol. 098, no. 005, 30 April 1998 (1998-04-30) & JP 10 023290 A (VICTOR CO OF JAPAN LTD), 23 January 1998 (1998-01-23) * abstract *		

TECHNICAL FIELDS SEARCHED (Int.Cl.7)
H04N

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	16 May 2002	Montanari, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 02 00 4853

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

16-05-2002

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9205661 A	02-04-1992	AT 146026 T	15-12-1996
		AU 8497891 A	15-04-1992
		CA 2089357 A1	15-03-1992
		CN 1062052 A	17-06-1992
		DE 69123455 D1	16-01-1997
		DE 69123455 T2	27-03-1997
		WO 9205661 A1	02-04-1992
		EP 0548113 A1	30-06-1993
		ES 2095951 T3	01-03-1997
		FI 931119 A	12-03-1993
		HK 58197 A	09-05-1997
		JP 6500901 T	27-01-1994
		KR 192830 B1	15-06-1999
		PT 98966 A	31-12-1993
		US 5396157 A	07-03-1995
		ZA 9107329 A	30-12-1992
EP 0567931 A	03-11-1993	EP 0567931 A1	03-11-1993
		DE 69319377 D1	06-08-1998
		DE 69319377 T2	29-10-1998
		SG 49305 A1	18-05-1998
		US 5491521 A	13-02-1996
JP 06284309 A	07-10-1994	NONE	
JP 10023290 A	23-01-1998	NONE	

ABSTRACT / ZUSAMMENFASSUNG / ABREGE

02004853.4

A video display apparatus comprising a vertical velocity modulation circuit for modulating the scanning speed in the vertical direction of the electron beam such that a part of the scanning line having a luminance which is not less than a predetermined value in a luminance change portion in the vertical direction moves farther apart from a part of the adjacent scanning line having a lower luminance than said predetermined value; and a frequency domain emphasis circuit for emphasizing a predetermined frequency domain of the electron beam movement control signal.

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European Patent Office
Branch at The Hague Search division

Office européen des brevets
Département à La Haye Division de la recherche

Calderbank, Thomas Roger
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London WC2B 6HP
GRANDE BRETAGNE

Datum/Date
12.06.02

Zeichen/Ref./Réf.	Anmeldung Nr./Application No./Demande n°./Patent Nr./Patent No./Brevet n°.
TRC/FP5995584	02004854.2-2202-

Anmelder/Applicant/Demandeur/Patentinhaber/Proprietor/Titulaire
MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.

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☒ The abstract was modified by the Search Division and the definitive text is attached to this communication.

The following figure will be published together with the abstract: 3

REFUND OF THE SEARCH FEE

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 00 4854

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X A	WO 92 05661 A (THOMSON CONSUMER ELECTRONICS) 2 April 1992 (1992-04-02) * page 2, line 9 - line 21 * * page 3, line 31 - page 4, line 11; figures 4,5 *	1,8,9 2-7	H04N3/32 H04N3/30
X A	EP 0 567 931 A (THOMSON CONSUMER ELECTRONICS) 3 November 1993 (1993-11-03) * page 3, line 53 - page 4, line 13 *	1,8,9 2-7	
A	PATENT ABSTRACTS OF JAPAN vol. 095, no. 001, 28 February 1995 (1995-02-28) & JP 06 284309 A (SONY CORP), 7 October 1994 (1994-10-07) * abstract *	1-9	
D,A	PATENT ABSTRACTS OF JAPAN vol. 098, no. 005, 30 April 1998 (1998-04-30) & JP 10 023290 A (VICTOR CO OF JAPAN LTD), 23 January 1998 (1998-01-23) * abstract *		

TECHNICAL FIELDS SEARCHED (Int.Cl.7)
H04N

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	17 May 2002	Montanari, M

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X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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O : non-written disclosure
P : intermediate document

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& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 02 00 4854

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17-05-2002

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO 9205661	A	02-04-1992	AT	146026 T	15-12-1996
			AU	8497891 A	15-04-1992
			CA	2089357 A1	15-03-1992
			CN	1062052 A	17-06-1992
			DE	69123455 D1	16-01-1997
			DE	69123455 T2	27-03-1997
			WO	9205661 A1	02-04-1992
			EP	0548113 A1	30-06-1993
			ES	2095951 T3	01-03-1997
			FI	931119 A	12-03-1993
			HK	58197 A	09-05-1997
			JP	6500901 T	27-01-1994
			KR	192830 B1	15-06-1999
			PT	98966 A	31-12-1993
			US	5396157 A	07-03-1995
			ZA	9107329 A	30-12-1992
EP 0567931	A	03-11-1993	EP	0567931 A1	03-11-1993
			DE	69319377 D1	06-08-1998
			DE	69319377 T2	29-10-1998
			SG	49305 A1	18-05-1998
			US	5491521 A	13-02-1996
JP 06284309	A	07-10-1994	NONE		
JP 10023290	A	23-01-1998	NONE		

ABSTRACT / ZUSAMMENFASSUNG / ABREGE

02004854.2

A video display apparatus comprising a vertical velocity modulation circuit for modulating the scanning speed in the vertical direction of the electron beam such that a part of the scanning line having a luminance which is not less than a predetermined value in a luminance change portion in the vertical direction moves farther apart from a part of the adjacent scanning line having a lower luminance than said predetermined value; and a frequency domain emphasis circuit for emphasizing a predetermined frequency domain of the electron beam movement control signal.

PATENT COOPERATION TREATY

PCT

REC'D 13 SEP 2000
WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
P20603-P0		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/JP99/03035	07/06/1999	12/06/1998
International Patent Classification (IPC) or national classification and IPC H04N3/32		
Applicant MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 16 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
25/10/1999	11.09.2000
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Montanari, M Telephone No. +49 89 2399 2602

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/JP99/03035

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-79	as originally filed			

Claims, pages:

82,85,86,89	as originally filed			
87,88,88bis,90-92, 95,95bis,95ter	as received on	27/03/2000	with letter of	24/03/2000
80,81,83,83bis, 84	as received on	24/08/2000	with letter of	22/08/2000
93,94	with telefax of	31/08/2000		

Drawings, sheets:

1/29-29/29	as originally filed	

2. The amendments have resulted in the cancellation of:

☐	the description,	pages:	
☒	the claims,	Nos.:	1,2,20,25,26
☐	the drawings,	sheets:	

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	3-19,21-24,27-31
	No:	Claims	
Inventive step (IS)	Yes:	Claims	3-8,21,27-29
	No:	Claims	9-19,22-24,30,31
Industrial applicability (IA)	Yes:	Claims	3-19,21-24,27-31
	No:	Claims	

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

The examination is being carried out on the **following application documents**:

Text for the Contracting States:
AT BE CH DE DK ES FI FR GB GR IT IE LI LU MC NL PT SE

Description, pages:

1-79	as originally filed			

Claims, pages:

82,85,86,89	as originally filed			
87,88,88bis,90-92, 95,95bis,95ter	as received on	27/03/2000	with letter of	24/03/2000
80,81,83,83bis, 84	as received on	24/08/2000	with letter of	22/08/2000
93,94	with telefax of	31/08/2000		

Drawings, sheets:

1/29-29/29	as originally filed

1. Reference is made to the following document:

   D1: WO 92 05661 A (THOMSON CONSUMER ELECTRONICS) 2 April 1992 (1992-04-02)

2. **Prior Art**

   Document D1 discloses a vertical deflection apparatus for a video display, said vertical deflection apparatus including a (common) vertical deflection and an additional vertical scan velocity modulation circuit (see claim 2) providing a vertical movement control signal such that a part of the scanning line having a luminance *difference with respect to its neighbours* which is not less than a predetermined

value in a luminance change portion in the vertical direction moves farther apart from the adjacent scanning line (see figures 4 and 5 and the description from page 3, line 31 to page 4, line 11).

Further, a horizontal deflection circuit is obviously present in all raster scan CRT-based displays, and therefore it is at least implicitly disclosed by D1 too.

3. **Claim 3**

3.1 The subject-matter of Claim 3 concerns a video display apparatus which differs from the apparatus disclosed by D1 in that

a) - the horizontal deflection is bidirectional;

b) - the vertical velocity modulation circuit comprises a "parallel scanning circuit" providing a signal for making the forward and backward scanning lines parallel;

c) - a synthesizing circuit for synthesizing the signal provided by the "parallel scanning circuit" and the movement control signal mentioned at point 2. It is pointed out that although the claim recites that the movement control signal is such that a part of the scanning line having a luminance (and not a luminance *difference with respect to its neighbours*) which is not less than a predetermined value in a luminance change portion in the vertical direction moves farther apart from the adjacent scanning line, these two expressions are considered to be substantially equivalent since the "predetermined value" is not specified;

d) - a vertical velocity modulation coil receiving the output signal of the synthesizing circuit.

3.2 The above features - not disclosed in combination by any of the documents cited in the International Search Report - allow a miniaturization and reduction of the cost of the aforementioned deflection apparatus because the vertical velocity modulation coil is shared as source of the VSVM magnetic field and of the parallel scanning magnetic field.

3.3 Consequently, this claim meets the requirements of Article 33(2) and (4) PCT.

Further, since adding the above features to the deflection apparatus disclosed by D1 is not an obvious design measure for the skilled person, this claim meets the requirements of Article 33(3) too.

4. **Claim 21 and 27**

Similar considerations and the same conclusion apply to **claims 21 and 27**, whose subject-matter is strictly related to the subject-matter of claim 3.

5. **Lack of conciseness**

The various definitions of the invention given in **independent claims 3, 9, 16, 18, 21, 22, 23, 27, 30 and 31** are such that the claims as a whole lack conciseness, contrary to Article 6 PCT. Moreover, lack of clarity of the claims as a whole arises, since the plurality of independent claims makes it difficult, if not impossible, to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection.

6. **Lack of inventive step**

For the reasons set out above at point 3.1(c), it appears that the features of the movement circuit, as presently claimed, can be read on to the corresponding features of the circuit disclosed by D1. Taking into account this, the subject-matter of

a) - **claim 9** differs from the subject-matter of D1 only in that more than one line is taken into account in evaluating the luminance difference and the claimed apparatus further includes a VSVM coil;

b) - **claim 16** differs from the subject-matter of D1 only in that the electron gun has a metal case and a VSVM coil is placed in a position departing from the periphery of said metal case;

c) - **claim 18** differs from the subject-matter of D1 only in that a frequency domain emphasis circuit is further provided and the claimed apparatus further includes a VSVM coil;

d) - **claims 22, 23, 30, 31** substantially corresponds to the same subject-matter of preceding claims and differs therefrom only with regard to the definition of

the subject-matter for which protection is sought and/or in respect of the claim category.

However, adding these features - which appear to be of a minor relevance - to the subject-matter of D1 is considered to be within the capabilities of the skilled person. Hence these claims are not considered to meet the requirements of Article 33(3) PCT.

7. The subject-matter of **claims 9, 16, 18, 22, 23, 30 and 31** does not include the inventive concept expressed hereabove at paragraph 3.2. The circuits providing the driving currents for generating the two aforementioned magnetic fields (or equivalent features) are not claimed both at the same time in all claims.

For this reason, and taking into account the disclosure of D1, it is possible that at a later stage of the procedure an objection of lack of unity of invention be raised. However, no formal objection in this sense is raised now due to the above objections of lack of conciseness and inventive step.

8. As to the **dependent claims 4-8, 28 and 29,** their subject-matter better specifies features included in the claims on which they depend or concerns new features added thereto.
Thus these claims relate to the general subject-matter of the application as a whole, matter considered to be novel and inventive.

9. The additional features disclosed in the **remaining dependent claims** are either known from the cited document D1 or considered to be within the capabilities of the skilled person, and therefore they do not appear, to add anything inventive to the subject-matter of the claims on which they depend.
Therefore these claims do not appear to meet the requirements of Article 33(3) PCT either.

10. The claims are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in a preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in a characterising part (Rule

6.3(b)(ii) PCT).

11. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

12. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	**ES**	Spain	**LS**	Lesotho	**SI**	Slovenia
AM	Armenia	**FI**	Finland	**LT**	Lithuania	**SK**	Slovakia
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CF	Central African Republic	**JP**	Japan	**NE**	Niger	**VN**	Viet Nam
CG	Congo	**KE**	Kenya	**NL**	Netherlands	**YU**	Yugoslavia
CH	Switzerland	**KG**	Kyrgyzstan	**NO**	Norway	**ZW**	Zimbabwe
CI	Côte d'Ivoire	**KP**	Democratic People's Republic of Korea	**NZ**	New Zealand		
CM	Cameroon			**PL**	Poland		
CN	China	**KR**	Republic of Korea	**PT**	Portugal		
CU	Cuba	**KZ**	Kazakstan	**RO**	Romania		
CZ	Czech Republic	**LC**	Saint Lucia	**RU**	Russian Federation		
DE	Germany	**LI**	Liechtenstein	**SD**	Sudan		
DK	Denmark	**LK**	Sri Lanka	**SE**	Sweden		
EE	Estonia	**LR**	Liberia	**SG**	Singapore		

INTERNATIONAL SEARCH REPORT

International Application No
PCT/JP 99/03035

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04N3/32 H04N3/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	WO 92 05661 A (THOMSON CONSUMER ELECTRONICS) 2 April 1992 (1992-04-02) page 2, line 9 - line 21 page 3, line 31 - page 4, line 11; figures 4,5	1,9, 16-20, 25,30,31 2-8,21, 26-29 10-15, 22-24
X	EP 0 567 931 A (THOMSON CONSUMER ELECTRONICS) 3 November 1993 (1993-11-03) page 3, line 53 - page 4, line 13	1,20,25
Y	PATENT ABSTRACTS OF JAPAN vol. 095, no. 001, 28 February 1995 (1995-02-28) & JP 06 284309 A (SONY CORP), 7 October 1994 (1994-10-07) abstract	2-8,21, 26-29

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 August 1999	17/09/1999

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Montanari, M

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/JP 99/03035

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/JP 99/03035

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CLAIMS

1. A video display apparatus comprising:

a horizontal deflection circuit for deflecting an electron beam in the horizontal direction to form scanning lines in the horizontal direction on a screen;

a vertical deflection circuit for deflecting said electron beam in the vertical direction; and

a vertical velocity modulation circuit for modulating the scanning speed in the vertical direction of the electron beam such that a part of the scanning line having a luminance which is not less than a predetermined value in a luminance change portion in the vertical direction moves farther apart from a part of the adjacent scanning line having a lower luminance than said predetermined value.

2. The video display apparatus according to claim 1, wherein said horizontal deflection circuit deflects the electron beam back and forth in the horizontal direction, to form forward and backward scanning lines on the screen.

3. The video display apparatus according to claim 2, wherein

said vertical velocity modulation circuit comprises

a parallel scanning circuit for outputting a parallel scanning signal for making the forward and backward scanning lines formed by said horizontal deflection circuit parallel,

a movement control circuit for producing a movement control signal for controlling the movement in the vertical direction of the scanning lines on the basis of a luminance signal,

a synthesizing circuit for synthesizing the parallel scanning signal outputted by said parallel scanning circuit and the movement control signal produced by said movement control circuit, and

a vertical velocity modulation coil for generating a magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of a signal synthesized by said synthesizing circuit.

4. The video display apparatus according to claim 3, wherein

said movement control circuit comprises

a change portion detection circuit for detecting a luminance change portion in the vertical direction on the basis of the luminance signal,

a movement distance output circuit for outputting as said movement control signal the distance of movement of the scanning line on the screen in the vertical direction in the

wherein said gain control circuit controls the gain of said amplifier on the basis of the number of the scanning lines formed on the screen by said horizontal deflection circuit.

8. The video display apparatus according to claim 6, wherein said gain control circuit controls the gain of said amplifier depending on the positions of the scanning lines formed on the screen by said horizontal deflection circuit.

9. The video display apparatus according to claim 1, wherein

said vertical velocity modulation circuit comprises

a movement distance output circuit for outputting the distance of movement on the screen of a part of the scanning line to be an object as the movement control signal on the basis of the difference between the luminance of a part of the scanning line a predetermined number of horizontal scanning periods ahead of and the luminance of a part of the scanning line the predetermined number of horizontal scanning periods behind the part of the scanning line to be the object and the level of the luminance of the part of the scanning line to be the object, and

a vertical velocity modulation coil for generating a magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of the

movement control signal outputted from said movement distance output circuit.

10. The video display apparatus according to claim 9, wherein

said movement distance output circuit comprises

a difference calculation circuit for calculating the difference between the luminance of the part of the scanning line the predetermined number of horizontal scanning periods ahead of and the luminance of the part of the scanning line the predetermined number of horizontal scanning periods behind the part of the scanning line to be the object,

a first signal output circuit for outputting a first movement distance signal on the basis of an output signal of said difference calculation circuit,

a second signal output circuit for outputting a second movement distance signal on the basis of the luminance of the part of the scanning line to be the object, and

a multiplication circuit for multiplying the first movement distance signal outputted from said first signal output circuit and the second movement distance signal outputted from said second signal output circuit together, and outputting the result of the multiplication as said movement control signal.

behind the part of the scanning line to be the object are not less than the predetermined value, and the luminance of the part of the scanning line two horizontal scanning periods ahead of, the luminance of the part of the scanning line three horizontal scanning periods ahead of, and the luminance of the part of the scanning line three horizontal scanning periods behind the part of said scanning line to be the object are less than the predetermined value, or when the luminance of the part of the scanning line to be the object and the luminance of the part of the scanning line two horizontal scanning periods ahead of the part of said scanning line to be the object are not less than the predetermined value, and the luminance of the part of the scanning line two horizontal scanning periods behind, the luminance of the part of the scanning line three horizontal scanning periods behind, and the luminance of the part of the scanning line three horizontal scanning periods ahead of the part of said scanning line to be the object are less than the predetermined value.

16. The video display apparatus according to claim 1, further comprising

a cathode ray tube, and

an electron gun provided in said cathode ray tube and having a metal case,

said vertical velocity modulation circuit comprising a movement control circuit for producing a movement control signal for controlling the movement in the vertical direction of the scanning lines on the basis of the luminance signal, and

a vertical velocity modulation coil disposed in a position departing from the periphery of said metal case of said electron gun and around said cathode ray tube for generating a magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of said movement control signal produced by said movement control circuit.

17. The video display apparatus according to claim 16, further comprising a deflection yoke disposed in the position departing from the periphery of said metal case of said electron gun and around said cathode ray tube, and constituting said horizontal deflection circuit and said vertical deflection circuit,

said vertical velocity modulation coil being arranged inside said deflection yoke.

18. The video display apparatus according to claim 1, wherein

said vertical velocity modulation circuit comprises

20. A vertical velocity modulation apparatus for modulating the scanning speed in the vertical direction of an electron beam for successively forming scanning lines in the horizontal direction on a screen, comprising:

a movement control circuit for producing a movement control signal for controlling the movement in the vertical direction of the scanning lines such that a part of the scanning line having a luminance which is not less than a predetermined value in a luminance change portion in the vertical direction on the basis of a luminance signal moves farther apart from a part of the adjacent scanning line having a lower luminance than said predetermined value; and

a vertical velocity modulation coil for generating a magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of the movement control signal produced by said movement control circuit.

21. The vertical velocity modulation apparatus according to claim 20, further comprising

a parallel scanning circuit for outputting a parallel scanning signal for making forward and backward scanning lines formed on the screen by deflecting the electron beam back and forth parallel, and

a synthesizing circuit for synthesizing the movement

control signal produced by said movement control circuit and the parallel scanning signal outputted by said parallel scanning circuit,

said vertical velocity modulation coil generating a magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of a signal synthesized by said synthesizing circuit.

22. The vertical velocity modulation apparatus according to claim 20, wherein said movement control circuit outputs the distance of movement on the screen of a part of the scanning line to be an object as said movement control signal on the basis of the difference between the luminance of a part of the scanning line a predetermined number of horizontal scanning periods ahead of and the luminance of a part of the scanning line the predetermined number of horizontal scanning periods behind the part of the scanning line to be the object and the level of the luminance of the part of the scanning line to be the object.

23. The vertical velocity modulation apparatus according to claim 20, further comprising a frequency domain emphasis circuit for emphasizing a predetermined frequency domain of said movement control signal produced by said movement control circuit.

24. The vertical velocity modulation apparatus according to claim 23, wherein

said frequency domain emphasis circuit comprises an extraction circuit for extracting said predetermined frequency domain of said movement control signal produced by said movement control circuit, and

an adder for adding said movement control signal produced by said movement control circuit and the signal in said frequency domain extracted by said extraction circuit.

25. A video display method comprising the steps of:

deflecting an electron beam in the horizontal direction and the vertical direction, to successively form scanning lines in the horizontal direction on a screen; and

modulating the scanning speed in the vertical direction of the electron beam such that a part of the scanning line having a luminance which is not less than a predetermined value in a luminance change portion in the vertical direction moves farther apart from a part of the adjacent scanning line having a lower luminance than said predetermined value.

26. The video display method according to claim 25, wherein the step of deflecting said electron beam comprises the step of deflecting the electron beam back and forth in

the horizontal direction, to form the forward and backward scanning lines on the screen.

27. The video display method according to claim 26, wherein

the step of modulating said scanning speed comprises the steps of

outputting a parallel scanning signal for making the forward and backward scanning lines parallel,

producing a movement control signal for controlling the movement in the vertical direction of the scanning line in a luminance change portion in the vertical direction on the basis of a luminance signal,

synthesizing said parallel scanning signal and said movement control signal, and

generating a magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of a synthesized signal.

28. The video display method according to claim 27, wherein

the step of producing said movement control signal comprises the steps of

detecting the luminance change portion in the vertical direction on the basis of the luminance signal,

outputting the distance of movement of the scanning line on the screen in the vertical direction in said luminance change portion as said movement control signal on the basis of the luminance signal, and

reversing the time axis of said movement control signal in said backward scanning.

29. The video display method according to claim 27, wherein

the step of modulating said scanning speed comprisesthe step of

clamping said movement control signal to a predetermined potential at predetermined timing.

30. The video display method according to claim 25, wherein

the step of modulating said scanning speed comprises the step of

setting the distance of movement on the screen of the part of said scanning line to be the object on the basis of the difference between the luminance of the part of the scanning line the predetermined number of horizontal scanning periods ahead of and the luminance of the part of the scanning line the predetermined number of horizontal scanning periods behind the part of the scanning line to be

the object and the level of the luminance of the part of the scanning line to be the object.

31. The video display method according to claim 25, wherein

the step of modulating said scanning speed comprises the steps of

producing a movement control signal for controlling the movement in the vertical direction of the scanning lines on the basis of the luminance signal,

emphasizing a predetermined frequency domain of said movement control signal, and

generating a magnetic field for modulating the scanning speed in the vertical direction of the electron beam on the basis of said movement control signal.